In the Claims:

CLAIMS

1. (Previously presented) A plasma etching method comprising:

etching a semiconductor wafer having a photoresist material thereon with a plasma etching material, the plasma etching material forming a polymer comprising carbon and a halogen over at least some internal surfaces of a plasma etch chamber;

after forming the polymer, plasma etching using a gas effective to etch polymer from chamber internal surfaces and photoresist from the semiconductor wafer; the gas having a hydrogen component effective to form a gaseous hydrogen halide from halogen liberated from the polymer; and

wherein the gas comprises O_2, and wherein the hydrogen component and O_2 are provided in the chamber during the plasma etching at a volumetric ratio of the one to the another of at least 0.1:1 of O_2 to the hydrogen component.

2. (Original) The plasma etching method of claim 1 wherein the halogen is selected from the group consisting of fluorine, chlorine and mixtures thereof.

3. (Original) The plasma etching method of claim 1 wherein the halogen comprises fluorine.

Claims 4 and 5 (Canceled).

6. (Original) The plasma etching method of claim 1 wherein the hydrogen component comprises NH_3.

7. (Original) The plasma etching method of claim 1 wherein the hydrogen component comprises H_2.

Claims 8 and 9 (Canceled).

10. (Previously presented) A plasma etching method comprising:

etching a semiconductor wafer with a plasma etching material, the material forming a polymer comprising carbon and a halogen over at least some internal surfaces of a plasma etch chamber;

after forming the polymer, plasma etching at subatmospheric pressure using a gas effective to etch polymer from chamber internal surfaces; the gas comprising a carbon compound effective to getter the halogen from the etched polymer; and

wherein the gas comprises an oxygen component forming an oxygen and carbon compound mixture, and wherein the carbon compound is provided at from about 5% to about 80% by volume of the oxygen and carbon compound mixture.

11. (Original) The plasma etching method of claim 10 wherein the gettering comprises forming a gaseous hydrogen halide from the etched halogen.

12. (Original) The plasma etching method of claim 10 wherein the gettering comprises forming a gaseous COA_x compound, where A is the etched halogen.

13. (Original) The plasma etching method of claim 10 wherein the carbon compound comprises a hydrocarbon.

Claims 14 and 15 (Canceled).

16. (Original) The plasma etching method of claim 10 wherein the carbon compound comprises a C-O bond.

17. (Original) The plasma etching method of claim 10 wherein the carbon compound comprises CO.

18. (Original) The plasma etching method of claim 10 wherein the carbon compound comprises CO formed from CO_2 injected into the chamber.

19. (Original) The plasma etching method of claim 10 wherein the halogen comprises fluorine.

Claim 20 (Canceled).

21. (Previously presented) A plasma etching method comprising:

positioning a semiconductor wafer on a wafer receiver within a plasma etch chamber;

first plasma etching material on the semiconductor wafer with a gas comprising carbon and a halogen, a polymer comprising carbon and the halogen forming over at least some internal surfaces of the plasma etch chamber during the first plasma etching;

after the first plasma etching and with the wafer on the wafer receiver, second plasma etching at subatmospheric pressure using a gas effective to etch polymer from chamber internal surfaces and getter halogen liberated from the polymer to restrict further etching of the material on the semiconductor wafer during the second plasma etching, the gas comprising at least H_2 and NH_3; and

wherein the second plasma etching is conducted with the receiver having a temperature which is allowed to float.

22. (Original) The plasma etching method of claim 21 wherein the receiver is biased during the first plasma etching and provided at ground or floating potential during the second plasma etching.

23. (Original) The plasma etching method of claim 21 wherein the gas comprises hydrogen which combines with the halogen during the second plasma etching to form a gaseous hydrogen halide.

24. (Previously presented) The plasma etching method of claim 21 wherein the second etching is conducted at a chamber pressure of from about 30 mTorr to about 5 Torr.

25. (Original) The plasma etching method of claim 21 wherein the halogen comprises fluorine.

26. (Original) The plasma etching method of claim 21 wherein the gas comprises an oxygen component.

27. (Original) The plasma etching method of claim 21 wherein the gas comprises NH_3, with hydrogen from the NH_3 combining with the halogen during the second plasma etching to form a gaseous hydrogen halide.

28. (Original) The plasma etching method of claim 21 wherein the gas comprises H_2 which combines with the halogen during the second plasma etching to form a gaseous hydrogen halide.

Claim 29 (Canceled).

30. (Original) The plasma etching method of claim 21 wherein the first and second plasma etchings are conducted at subatmospheric pressure, and the wafer remaining *in situ* on the receiver intermediate the first and second etchings, and maintaining the chamber at a subatmospheric pressure at all time intermediate the first and second plasma etchings.

Claim 31 (Canceled).

32. (Original) The plasma etching method of claim 21 wherein the gas comprises a carbon compound effective for the gettering.

33. (Original) The plasma etching method of claim 32 wherein the carbon compound comprises a hydrocarbon.

Claims 34 and 35 (Canceled).

36. (Previously presented) A plasma etching method comprising:

positioning a semiconductor wafer on a wafer receiver within a plasma etch chamber, the semiconductor wafer having a photoresist layer formed thereon;

negatively biasing the wafer receiver to a range of 100 to 400 volts;

first plasma etching material on the semiconductor wafer through openings formed in the photoresist layer with a gas comprising carbon and a halogen, a polymer comprising carbon and the halogen forming over at least some internal surfaces of the plasma etch chamber during the first plasma etching; and

after the first plasma etching and with the wafer on the wafer receiver, second plasma etching at subatmospheric pressure using a gas having one or more components effective to etch photoresist from the wafer and polymer from chamber internal surfaces and getter halogen liberated from the polymer to restrict further etching of the material on the semiconductor wafer during the second plasma etching, the gas having the one or more components comprising at least H_2 and CH_4.

37. (Previously presented) The plasma etching method of claim 36 wherein one of the gas components comprises hydrogen which combines with the halogen during the second plasma etching to form a gaseous hydrogen halide.

38. (Original) The plasma etching method of claim 36 wherein one of the gas components comprises O_2 and another is hydrogen atom containing.

39. (Previously presented) The plasma etching method of claim 36 wherein one of the gas components comprises O_2 and another is hydrogen atom containing, said one component and said another component being provided in the chamber during the second plasma etching at a volumetric ratio of the one to the another of at least 0.1:1 of O_2 to the hydrogen component.

40. (Original) The plasma etching method of claim 36 wherein the halogen comprises fluorine.

41. (Original) The plasma etching method of claim 36 wherein one of the gas components comprises NH_3, with hydrogen from the NH_3 combining with the halogen during the second plasma etching to form a gaseous hydrogen halide.

42. (Original) The plasma etching method of claim 36 wherein one of the gas components comprises H_2 which combines with the halogen during the second plasma etching to form a gaseous hydrogen halide.

Claim 43 (Canceled).

44. (Original) The plasma etching method of claim 36 wherein the first and second plasma etchings are conducted at subatmospheric pressure, and the wafer remaining *in situ* on the receiver intermediate the first and second etchings, and maintaining the chamber at a subatmospheric pressure at all time intermediate the first and second plasma etchings.

Claim 45 (Canceled).

46. (Original) The plasma etching method of claim 36 wherein the gas comprises a carbon compound effective for the gettering.

47. (Previously presented) A plasma etching method comprising:

positioning a semiconductor wafer on an electrostatic chuck within an inductively coupled plasma etch chamber, the semiconductor wafer having a photoresist layer formed on an insulative oxide layer, the photoresist layer having contact opening patterns formed therethrough;

first plasma etching contact openings within the insulative oxide on the semiconductor wafer through the contact opening patterns formed in the photoresist layer with a gas comprising carbon and fluorine, a polymer comprising carbon and fluorine forming over at least some internal surfaces of the plasma etch chamber during the first plasma etching; and

after the first plasma etching and with the wafer on the electrostatic chuck, providing the electrostatic chuck at ground or floating potential while second plasma etching at subatmospheric pressure using a gas comprising an oxygen component and a hydrogen component effective to etch photoresist from the wafer and polymer from chamber internal surfaces, and forming HF during the second plasma etching from fluorine liberated from the polymer to restrict widening of the contact openings formed in the insulative oxide resulting from further etching of the material on the semiconductor wafer during the second plasma etching, the hydrogen component comprising at least a hydrocarbon and NH_3.

48. (Original) The plasma etching method of claim 47 wherein the oxygen comprises O_2.

Claim 49 (Canceled).

50. (Original) The plasma etching method of claim 47 wherein the hydrogen component comprises H_2.

Claims 51 and 52 (Canceled).

53. (Original) The plasma etching method of claim 47 wherein the first and second plasma etchings are conducted at subatmospheric pressure, and the wafer remaining *in situ* on the electrostatic chuck intermediate the first and second etchings, and maintaining the chamber at a subatmospheric pressure at all time intermediate the first and second plasma etchings.

54. (Previously presented) A plasma etching method comprising:

positioning a semiconductor wafer on an electrostatic chuck within an inductively coupled plasma etch chamber, the semiconductor wafer having a photoresist layer formed on an insulative oxide layer, the photoresist layer having contact opening patterns formed therethrough;

first plasma etching contact openings within the insulative oxide on the semiconductor wafer through the contact opening patterns formed in the photoresist layer with a gas comprising carbon and fluorine, a polymer comprising carbon and fluorine forming over at least some internal surfaces of the plasma etch chamber during the first plasma etching; and

after the first plasma etching and with the wafer on the electrostatic chuck, providing the electrostatic chuck at ground or floating potential while second plasma etching at subatmospheric pressure using a gas comprising an oxygen component and a carbon component effective to etch photoresist from the wafer and polymer from chamber internal surfaces, and gettering fluorine liberated from the polymer during the second plasma etching with the carbon component to restrict widening of the contact openings formed in the insulative oxide resulting from further etching of the material on the semiconductor wafer during the second plasma etching.

55. (Original) The plasma etching method of claim 54 wherein the gettering comprises forming a gaseous hydrogen halide from the etched halogen.

56. (Original) The plasma etching method of claim 54 wherein the gettering comprises forming a gaseous COA_x compound, where A is the etched halogen.

57. (Original) The plasma etching method of claim 54 wherein the carbon compound comprises a C-O bond.

58. (Previously presented) The plasma etching method of claim 21 wherein the second plasma etching is conducted with the receiver having a temperature without maintaining the temperature within a controlled temperature range.

59. (Previously presented) A plasma etching method comprising:

positioning a semiconductor wafer on an electrostatic chuck within an inductively coupled plasma etch chamber, the semiconductor wafer having a photoresist layer formed on an insulative oxide layer, the photoresist layer having contact opening patterns formed therethrough;

first plasma etching contact openings within the insulative oxide on the semiconductor wafer through the contact opening patterns formed in the photoresist layer with a gas comprising carbon and fluorine, a polymer comprising carbon and fluorine forming over at least some internal surfaces of the plasma etch chamber during the first plasma etching; and

after the first plasma etching and with the wafer on the electrostatic chuck, second plasma etching at subatmospheric pressure using a gas comprising O_2, a carbon component and NH_3 effective to etch photoresist from the wafer and polymer from chamber internal surfaces, and gettering fluorine liberated from the polymer during the second plasma etching with the carbon component to restrict widening of the contact openings formed in the insulative oxide resulting from further etching of the material on the semiconductor wafer during the second plasma etching, providing the O_2 and NH_3 in the plasma etch chamber at 1,000 sccm and 60 sccm, respectively.

60. (Previously presented) The plasma etching method of claim 59 wherein the gas comprising the O_2, the carbon component and the NH_3 further comprises H_2.

61. (Previously presented) The plasma etching method of claim 59 wherein the carbon component comprises CH_4.

62. (Previously presented) The plasma etching method of claim 1 wherein the O_2 is provided at a flow rate of 1000 sccm.

63. (Previously presented) The plasma etching method of claim 1 wherein the hydrogen component comprises at least H_2 and NH_3.

64. (Previously presented) The plasma etching method of claim 1 wherein the hydrogen component comprises at least NH_3 and CH_4.

65. (Previously presented) The plasma etching method of claim 1 wherein the hydrogen component comprises H_2, NH_3 and CH_4.

66. (Previously presented) The plasma etching method of claim 1 wherein the hydrogen component comprises N_2 at about 96% or greater and H_2 at about 4% or less, by volume.

67. (Previously presented) The plasma etching method of claim 10 wherein the carbon compound comprises aldehyde.

68. (Previously presented) The plasma etching method of claim 10 wherein the carbon compound comprises ketone.

69. (Previously presented) The plasma etching method of claim 21 wherein the gas effective to etch the polymer comprises NH_3 and CH_4.

70. (Previously presented) The plasma etching method of claim 21 wherein the gas effective to etch the polymer comprises H_2, NH_3 and CH_4.

71. (Previously presented) The plasma etching method of claim 21 wherein the gas effective to etch the polymer comprises N_2 at about 96% or greater and H_2 at about 4% or less, by volume.

72. (Previously presented) The plasma etching method of claim 36 wherein the gas having the one or more components comprises H_2 and NH_3.

73. (Previously presented) The plasma etching method of claim 36 wherein the gas having the one or more components comprises NH_3 and CH_4.

74. (Previously presented) The plasma etching method of claim 36 wherein the gas having the one or more components comprises N_2 at about 96% or greater and H_2 at about 4% or less, by volume.

75. (Previously presented) The plasma etching method of claim 47 wherein the hydrogen component comprises CH_4.

76. (Previously presented) The plasma etching method of claim 47 wherein the hydrogen component comprises H_2 and CH_4.

77. (Previously presented) The plasma etching method of claim 47 wherein the hydrogen component comprises N_2 at about 96% or greater and H_2 at about 4% or less, by volume.

78. (Previously presented) The plasma etching method of claim 54 wherein the carbon component comprises aldehyde.

79. (Previously presented) The plasma etching method of claim 54 wherein the carbon component comprises ketone.

80. (Previously presented) The plasma etching method of claim 1 wherein the semiconductor wafer comprises silicon dioxide.

81. (Previously presented) The plasma etching method of claim 10 wherein the semiconductor wafer comprises silicon dioxide.

82. (Previously presented) The plasma etching method of claim 21 wherein the semiconductor wafer comprises silicon dioxide.

83. (Previously presented) The plasma etching method of claim 36 wherein the semiconductor wafer comprises silicon dioxide.

84. (Previously presented) The plasma etching method of claim 47 wherein the semiconductor wafer comprises silicon dioxide.

85. (Previously presented) The plasma etching method of claim 54 wherein the semiconductor wafer comprises silicon dioxide.

86. (Previously presented) The plasma etching method of claim 59 wherein the semiconductor wafer comprises silicon dioxide.

87. (Previously presented) The plasma etching method of claim 1 wherein the plasma etching material comprises a different etchant chemistry relative to an etchant chemistry of the plasma etching using the gas to etch polymer.

88. (Previously presented) The plasma etching method of claim 10 wherein the plasma etching material comprises a different etchant chemistry relative to an etchant chemistry of the plasma etching at the subatmospheric pressure.

89. (Previously presented) The plasma etching method of claim 21 wherein the first plasma etching comprises a different etchant chemistry relative to an etchant chemistry of the second plasma etching.

90. (Previously presented) The plasma etching method of claim 36 wherein the first plasma etching comprises a different etchant chemistry relative to an etchant chemistry of the second plasma etching.

91. (Previously presented) The plasma etching method of claim 47 wherein the first plasma etching comprises a different etchant chemistry relative to an etchant chemistry of the second plasma etching.

92. (Previously presented) The plasma etching method of claim 54 wherein the first plasma etching comprises a different etchant chemistry relative to an etchant chemistry of the second plasma etching.

93. (Previously presented) The plasma etching method of claim 59 wherein the first plasma etching comprises a different etchant chemistry relative to an etchant chemistry of the second plasma etching.

94. (New) The plasma etching method of claim 47 wherein the oxygen comprises O_2, and wherein the O_2 is provided at a flow rate of 1000 sccm.